DOD-GEIS: DoD rickettsial diseases diagnostic support

Rickettsial and related diseases (e.g., epidemic and murine typhus, Rocky Mountain and Mediterranean spotted fever, African tick bite fever, scrub typhus, ehrlichioses and anaplasmosis) are prevalent in much of the developing world and have affected US forces during numerous deployments (Kelly DJ, Richards AL, Temenak J, et al. CID 2002;34:S145-69). The DoD Overseas Medical Research Laboratories perform surveillance for these diseases among host country patients in South America, Africa and Central and Southeast Asia and support DoD threat assessment. Because of limitations in commercial antibody detection kits, the DoD requires reference services such as serology confirmation, organism detection, and PCR system standardization. With support from DoD-GEIS, the Rickettsial Disease Department (RDD) of the Naval Medical Research Center (Silver Spring, MD) serves as the DoD reference laboratory for rickettsial and related diseases. The RDD has BSL-3 laboratories dedicated to rickettsial work and personnel trained in IFA, EIA, isolation, and PCR testing, and have developed FDA-certified tests for scrub typhus, spotted fever and typhus group rickettsia (including EIA, Dip-S-Ticks, and lateral flow devices). DoD healthcare personnel requiring rickettsial diagnostic support may contact Dr. Allen Richards, Director, RDD, for more information (RichardsA@NMRC.NAVY.MIL; 301-319-7668).

DOD-GEIS: Q fever

5 October - Query ("Q") fever is an acute febrile disease caused by the *Coxiella burnetii*. Thousands of Q Fever cases occurred among U.S. troops deployed to the European theater during WWII. More recently, *C. burnetii* has been recognized as a source of infection in U.S. military members returning from Iraq. Today, *C. burnetii* is considered a level B biothreat due to its moderate ease of transmission, morbidity, low mortality rate, and environmental stability. The symptoms tend towards non-specific and may include sudden onset of headache, fever, severe sweats, weakness and malaise. Many infections are subclinical and/or self-limiting. Hepatitis and pneumonia may be associated with fulminant disease and their incidence appears to cluster geographically. Untreated acute cases demonstrate a fatality rate of from less than 1% to as high as 2.4%. Chronic cases do exist in the form of endocarditis and may require extended periods of antibiotic therapy and eventual valve replacement.

C. burnetii occurs naturally around the world. Cattle, sheep, dogs, cats, goats and rabbits are natural reservoirs of the bacteria. Though usually asymptomatic, infected animals are capable of shedding huge numbers of organisms in placental tissue. Infection of humans normally occurs by inhalation of infectious particles in aerosols or by consuming unpasteurized dairy products. Ticks are also potential vectors of Q fever.

No commercially available vaccine currently exists. Infections are routinely amenable to treatment with tetracyclines.

Laboratory diagnosis is made by demonstrating a four-fold rise in specific IgG antibody titer between acute and convalescent blood samples or the presence of an IgM titer to *C. burnetii*. Antibodies including IgM specific for Phase II antigens are diagnostic for acute disease, whereas high titers of IgG (and IgA) to both Phase I and II antigens are associated with chronic disease. Removal of specific IgG may be necessary prior to detection of IgM specific for *C. burnetii*. Serum from chronic Q Fever cases may cross-react with antigens from *Bartonella* spp. Serological tests available include immunofluorescence (reference method), microagglutination, and

ELISA. In addition, many reference laboratories maintain molecular diagnostics in the form of conventional and quantitative real-time polymerase chain reaction assays.

Points of Contact:

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Molecular: Joan Gebhardt, Ph.D. 301-319-7519/7392

Immunology: Robert Bull, Ph.D. 301-319-7519/7392

References:

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